NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College under VTU)

Department of Computer Science and Engineering

Fifth Semester BE – Scheme

Sl. No.	Course Code	Course Name	Teaching Dept	L-T-P-S (Hrs/week)	Total Credits	Marks
1.	17CST51	Computer Networks	CS	3-0-0-0	3	100
2.	17CSI52	Microcontrollers(IC)	CS/EC	3-0-2-0	4	100
3.	17CST53	Operating Systems	CS	3-0-0-0	3	100
4.	17CST54	Software Engineering and Testing	CS	3-0-0-0	3	100
5.	17CSI55X	Foundation Elective-IV (IC)	CS	3-0-2-0	4	100
6.	17CST56X	Engineering Elective-V	CS	3-0-0-0	3	100
7.	17CSL57	Computer Networks Laboratory	CS	1-0-2-0	2	100
8.	17CSL58	Operating Systems Laboratory	CS	1-0-2-0	2	100
9.	17CSH59	General Aptitude	CS/BS&H	1-0-2-0	2	100
		Total		**21-0-10-0**	**26**	**900**

Foundation Elective-IV (IC)		
Sl. No	**Course Code**	**Course Name**
1	17CSI551	Advanced Algorithms (IC)
2	17CSI552	Object Oriented Programming with Java (IC)
3	17CSI553	Computer Graphics (IC)

Engineering Elective-V		
Sl. No	**Course Code**	**Course Name**
1	17CST561	Operations Research
2	17CST562	Computer Forensics (MOOCS)
3	17CST563	The Data Scientist's Toolbox (Certificate Course) Johns Hopkins University

NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College under VTU)

Department of Computer Science and Engineering

Sixth Semester BE - Scheme and Syllabus

Sl. No	Course Code	Course Name	Teaching Dept	L-T-P-S (Hrs/week)	Total Credits	Marks
1.	17CST61	Unix System Programming	CS	3-0-0-0	3	100
2.	17CST62	System Software	CS	3-0-0-0	3	100
3.	17CSI63	Embedded Systems (IC)	CS	3-0-2-0	4	100
4.	17CSI64X	Foundation Elective-VI (IC)	CS	3-0-2-0	4	100
5.	17CST65X	Engineering Elective-VII	CS	3-0-0-0	3	100
6.	17HOE66X	Open Elective –VIII	CS/BS&H	2-0-0-4	3	100
7.	17CSL67	Unix System Programming Laboratory	CS	1-0-2-0	2	100
8.	17CSH68	Technical Aptitude and Group Discussion	CS/BS&H	1-0-2-0	2	100
9.	17CSP69	Mini Project and Seminar	CS	1-0-2-0	2	100
		Total		**20-0-10-4**	**26**	**900**

Foundation Elective-VI (IC)		
Sl. No	**Course Code**	**Course Name**
1	17CSI641	Data Mining (IC)
2	17CSI642	Database Concepts (IC)
3	17CSI643	Soft Computing (IC)

Engineering Elective-VII		
Sl. No	**Course Code**	**Course Name**
1	17CST651	Artificial Intelligence
2	17CST652	Network Security (MOOCS)
3	17CST653	Operations Analytics (Certificate Course)Wharton University of Business

Open Elective –VIII		
Sl. No	**Course Code**	**Course Name**
1	17HOE661	Lab View – Level 1
2	17HOE662	Yoga & Meditation
3	17HOE663	Martial Arts
4	17HOE664	Music(Carnatic Vocal / Instrumental)
5	17HOE665	Dance
6	17HOE666	Sports
7	17HOE667	Online certification courses from IITs / IISC / SWAYAM / EDX

NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous College under VTU)
Department of Computer Science and Engineering
Seventh Semester BE – Scheme and Syllabus

Sl. No.	Course Code	Course Name	Teaching Dept.	L-T-P-S (Hrs/ week)	Total Credits	Marks
1.	16CSI71	Internet of Things (IoT) (IC)	CS	3-0-2-0	4	100
2.	16CST72	Android Application Development	CS	2-0-0-0	2	100
3.	16CSI73X	Foundation Elective-IX (IC)	CS	3-0-2-0	4	100
4.	16CST74X	Engineering Elective-X	CS	3-0-0-0	3	100
5.	16HOE75X	Open Elective-XI	CS/BS&H/ME	2-0-0-4	3	100
6.	16HOE76X	Open Elective-XII	CS/BS&H	2-0-0-4	3	100
7.	16CSL77	*Information and Network Security Laboratory*	CS	1-0-2-0	2	100
8.	16CSL78	Android Application Development laboratory	CS	1-0-2-0	2	100
9.	16CSP79	Project Phase I & Seminar	CS	0-0-6-0	3	100
		Total		**17-0-14-8**	**26**	**900**

Foundation Elective-IX (IC)		
Sl. No.	**Course Code**	**Course Name**
1	16CSI731	Object Oriented Modeling and Designing(IC)
2	16CSI732	Big Data (IC)
3	16CSI733	Web Technologies – Servlet, JSP (IC)

Engineering Elective-X		
Sl. No.	**Course Code**	**Course Name**
1	16CST741	System Modeling and Simulation
2	16CST742	C# and .Net (MOOCS)
3	16CST743	Managing Big Data with MySQL(Certificate Course) Duke University

Open Elective-XI		
Sl. No.	**Course Code**	**Course Name**
1	16HOE751	Tax Management
2	16HOE752	Assessment of Building Energy Performance (Offered by ASHRAE)
3	16HOE753	National Disaster Management & Mitigation
4	16HOE754	Certification Course (Online)

Open Elective-XII

Sl. No.	Course Code	Course Name
1	16HOE761	Small & Medium Enterprise Management
2	16HOE762	Occupational Safety & Health Administration
3	16HOE763	Animation & Multimedia Engineering
4	16HOE764	Certification Course (Online)

NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY
(An Autonomous College under VTU)
Department of Computer Science and Engineering
Eighth Semester BE – Scheme and Syllabus

Sl. No.	Course Code	Course Name	Teaching Dept.	Total Credits	Marks
1.	16CSP81	Project Phase II	CS	4	100
2.	16CSP82	Project Phase III	CS	4	100
3.	16CSP83	Evaluation and Viva voce (External)	CS	10	100
		Total		**18**	**300**

COMPUTER NETWORKS					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST51	**3:0:0:0**	**3**	**CIE:50 SEE:50**	**3 hours**	**FC**

Course Objectives:

This course will enable students to

- Become familiar with the basics of data communications.
- Understand OSI and TCP/IP models
- Understand the concepts of data link layer and network layer.
- Become familiar with the basics of packet switching.
- Understand the concepts of network security and network management and its applications.

Syllabus

Module – I

Introduction, Network model, Physical Layer & media:

Data Communications, Networks, Protocols & Standards, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite, Addressing, Transmission Impairment, Data Rate limits, Performance, Digital-digital conversion (Only Line coding: Polar, Bipolar and Manchester coding)

8 hours

Module – II

Switching & Data Link Layer:

Introduction to switching, Datagram Networks, Virtual Circuit Networks, Error Detection & Correction: Introduction, Block coding, Cyclic codes, Checksum. **8 hours**

Module – III

Data Link control, Network Layer :

Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy channels, HDLC, PPP (Framing, Transition phases only) Random access, Controlled Access, Channelization, Ethernet: IEEE standards. IPv4, IPv6. **8 hours**

Module – IV

Packet Switching Networks, Network Security: Routing in Packet networks, Shortest path routing: Bellman-Ford algorithm, Overview of network security, secret key encryption protocol, public key encryption protocols.

8 hours

Module – V

Applications and Network Management, Mobile AdHoc Networks: Application layer overview, Domain Name System (DNS), Remote Login Protocols, E-mail, FTP, World Wide Web and HTTP, Network management. Overview of Wireless Ad-Hoc networks, Routing in AdHoc Networks, Routing protocols for AdHoc networks. **8 hours**

Course Outcomes

On completion of this course, the students will be able to

- Design and solve problems on shortest path routing algorithms.
- Analyze framing concepts, flow and error control algorithms.
- Explain concepts of cryptography algorithms
- Design and apply application layer protocols.
- Analyze different networks.

Text Books:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition, Tata McGraw-Hill, July 2012, ISBN : 978-0-07-337622-6,(Chapters 1,2,3,4, 8, 10, 11, 12, 13)
2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks -Fundamental Concepts and Key

architectures, 2nd Edition, Tata McGraw-Hill, 2004, reprint 2007.
ISBN-13 : 978-0-07-059501-9,(Chapter 7)
3. Nader F. Mir: Computer and Communication Networks, 2nd Edition, Pearson Education, 2015, ISBN : 0133814742,(Chapters 9, 10, 19)

Reference Books:

1. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007, **ISBN-13:** 978-0133506488.
2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007, ISBN: 978-0-12-385059-1.

E-Resources:

1. https://archive.org/details/Data.Communications.and.Networking.5th.Edition
2.https://doc.lagout.org/network/Data%20Communications%20and%20Networking%20By%20Behrouz%20A.Forouzan.pdf
3.http://ptgmedia.pearsoncmg.com/images/9780133814743/samplepages/9780133814743.pdf

MICROCONTROLLERS(IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST52	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 Hours**	**FC**

Course Objectives:

This Course will enable students to:

- Gain knowledge about, microprocessors, microcontrollers and RISC & CISC CPU architectures.
- Learn the 8051 architecture and its assembly language programming.
- Familiarize with Embedded 'C' programming and counters & timers programming in 8051.
- Understand 8051 connections to RS-232 and Interrupts programming.
- Acquire knowledge about, interfacing of 8051 with LCD, Keyboard, DAC, ADC, Stepper motor.

Syllabus

Module – I

Introduction to Microcontrollers: Microprocessors and Microcontroller, Introduction, Difference between Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Embedded Electronic Systems and Microcontrollers, Comparison of different microcontrollers and applications.

The 8051 Architecture: Introduction, 8051 Microcontroller Hardware, Input / Output Pins, Ports and Circuits, External Memory. **8 hours**

Module – II

Assembly Language Programming in 8051: Addressing Modes and Instruction set: Introduction, Addressing modes, Data transfer instructions, Example Problems, Arithmetic instructions, Logical instructions, Example

Problems, JUMP and CALL Program range, Jumps, calls and Subroutines, Returns, Example Problems.
8 hours

Module – III

Embedded 'C' Programming: 8051 programming in C: Data types and time delays in 8051 C, I/O programming, logic operations, data conversion programs, accessing code ROM space, data serialization. **Timer / Counter Programming in 8051**: Counters and timers programming 8051 Timers, Counter Programming, programming timers 0 and 1 in 8051 C. **8 hours**

Module – IV

8051 Serial Communication: Basics of Serial Communication- Serial data input/output, 8051 connections to RS-232, 8051 Serial Communication Programming

Interrupts Programming: 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Interrupt programming in C
8 hours

Module – V

8051 Interfacing and Applications: Interfacing 8051 to LCD, Keyboard, DAC, ADC Stepper motor interfacing.**8 hours**

Laboratory:

Programming for the 8051 Microcontroller:

1a. To perform the multiplication of two 16-bit numbers.
1b. To implement (display) an eight bit UP/DOWN decimal counter on watch window.
2a. To sort block of data in ascending or descending order.
2b. To interface a DAC & Generate a square wave with specified amplitude and frequency using DAC. Display the waveform on the CRO.
3a. To count number of ones and zeros in an eight bit number.
3b. To interface an ADC and temperature Sensor to measure temperature.
4a. To convert an 8-bit BCD number into ASCII.
4b. To Interface a stepper motor – and rotate it clock wise or anti clock wise through a given number of steps.
5a. To check whether given number is palindrome or not. If palindrome store FFh in accumulator else store 00h in accumulator.
5b. To generate 1second delay continuously using on chip timer.

Course Outcomes: Student will be able to

- Explain the basic concepts of microprocessors, RISC & CISC CPU and architecture of 8051 microcontroller.
- Write assembly language programming in 8051.
- Develop assembly and embedded C Programming for 8051 microcontroller
- Discuss 8051 connections to RS-232 and Interrupts programming.
- Design and develop applications related to interfacing of 8051 to LCD, Keyboard, DAC, ADC, Stepper motor.

Text Books:

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Janice GillispieMazidi,"The 8051 Microcontroller: A Systems Approach", Pearson Education, Limited, 2013, ISBN 1292027266, 9781292027265. Chapters 1,2,3,5,7,8
2. Kenneth J. Ayala, "The 8051 Microcontroller Architecture, Programming & Applications", 2e, Thomson Learning, 2005, ISBN 0314772782, 9780314772787. Chapters 1,4,5

Reference Books:

1. Predko, "Programming and Customizing the 8051 Microcontroller", TMH.ISBN-10: 8131706974
2. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.ISBN-13: 978-8131706978

E-Resources:

https://yvuqarox.files.wordpress.com/2015/06/myke-predko-8051-pdf.pdf

https://books.google.co.in/books?id=pWlbvW0H3IAC&pg=PA663&lpg=PA663&dq=1.%09Rajkamal,+%E2%80%9CMicrocontrollers:+Architecture,

OPERATING SYSTEMS					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST53	**3-0-0-0**	**3**	**CIE:50 SEE:50**	**3 Hours**	**FC**

Course Objectives:

This course will enable students to

- Learn various concepts of operating system
- Learn the concepts of Process synchronization
- Gain knowledge about deadlock's occurring in resource allocation.
- Understand the memory management function of operating system
- Realize the role of operating system in file management.

Syllabus

Module – I

Introduction to Operating Systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; Operating System structure; Virtual machines; Operating System generation; System boot.

8 hours

Module – II

Process Management: Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling **8 hours**

Module – III

Process Synchronization: Synchronization: The critical section problem, semaphores, classical problems of synchronization.

Deadlocks: Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

9 hours

Module – IV

Memory Management: Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Page replacement; Allocation of frames. **8 hours**

Module – V

File System, Implementation of File System: File System: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

7 hours

Course Outcomes

On completion of this course, the students will be able to

- Explain the concepts of Operating System Structure, Operations and Services.
- Design new techniques for Multithreaded Programming, Process Scheduling and Synchronization.

- Apply the skills of deal lock prevention and avoidance.
- Design and implement Memory management Algorithms.
- Explain the concept of file systems.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: "Operating System Principles", Wiley India, Chapters(1,2,3,4,5,6,7,8,9,10,11,12) 8th edition, 2009. ISBN: 9781118063330

Reference Books:

1. D.M Dhamdhere: "Operating systems - A concept based Approach", Tata McGraw- Hill, 2nd Edition, 2002. ISBN: 978–0–07–295769–3
2. P.C.P. Bhatt: "Introduction to Operating Systems: Concepts and Practice", (Chapters: 1, 2, 31 to 3.4 , 4.1 to 4.4, 5.1 to 5.5, 6.1 to 6.7, 7, 8.1 to 8.6, 9.1 to 9.6, 10, 11.1 to 11.5, 12.1 to 12.6, 14.1 to 14.8, 21.1 to 21.9) , PHI, 4th Edition, 2008. ISBN: 978-81-203-4836-3
3. Harvey M Deital: "Operating systems", Pearson Education, 3rd Edition, 1990. ISBN 978-0131828278

E-Resources:

1. http://nptel.ac.in/courses/106108101/
2. http://study.com/academy/lesson/computer-operating-systems-managing-hardware-and-software-resources.html

SOFTWARE ENGINEERING & TESTING					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST54	**3:0:0:0**	**3**	**CIE:50 SEE:50**	**3 hours**	**FC**

Course Objectives:

This course will enable students to understand:

Course Objectives:

- Understand the real world applications with the aid of software engineering techniques along with professional ethics and responsibilities.
- Understand the importance of SDLC life cycle in realtime.
- Student will be able to describe Software and Hardware Testing.

Syllabus

Module – I

Introduction: Introduction: FAQ's about software engineering, Professional and ethical responsibility. Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and

computer systems; Legacy systems. Critical Systems: A simple safety critical system; System dependability; Availability and reliability

8Hours

Module – II

Requirements & Project Management: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The software requirements document. Project Management: Management activities; Project planning; Project scheduling.

8Hours

Module – III

Software Development & Verification and Validation: Agile methods; Extreme programming; Rapid application development. Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods.

8Hours

Module – IV

A Perspective on Testing, Examples: Basic definitions, Test cases, Software testing: Component testing; Test case design; Test automation, Levels of testing.

Boundary Value Testing: Boundary value analysis, Robustness testing, Worst-case testing, Special value testing.

8Hours

Module – V

Equivalence Class Testing, Decision Table- Based Testing: Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations.

Path Testing, Data Flow Testing: DD paths, Test coverage metrics, Basis path testing.

8Hours

Course Outcomes: On successful completion of this module, students should be able to:

1. Understand the real world applications with the aid of software engineering techniques along with professional ethics and responsibilities.
2. Learn the requirements engineering process, feasibility studies and its validation.
3. Design software in structured, organized ways and demonstrate effective, practical ways to design and develop high quality software.
4. Write Test cases , Test plan based on test scenario.
5. Analyze using static analysis tools (Inspection, walk through and peer review) and automate high quality tests during unit and integration testing.

Text Books:

1. Ian Sommerville: *Software Engineering*, 8th Edition, Pearson Education, 2007, ISBN-13: 978-0137035151.
   Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008. **ISBN** 9781439889510 - CAT# KE14611

Reference Books:

1 Roger.S.Pressman: Software Engineering-A Practitioners approach, 7th Edition, McGraw Hill, 2007.
2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India, 2009.
3. Myers GJ: The Art of Software testing, Wiley-Dreantech India Pvt. Ltd., 2004.
4. LoiseTamres: Introducing Software Testing, Pearson Education, 2003.

FOUNDATION ELECTIVE – IV (IC)

ADVANCED ALGORITHMS (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSI551	**3-0-2-0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FE**

Course Objectives:

This course will enable students to:

- Learn methods for solving recurrences, which are useful for describing the running times of recursive algorithms.
- Understand the graph search algorithms and network flow problems.
- Gain knowledge about number - theoretic algorithms
- Get exposed to string - matching algorithms.
- To introduce probabilistic analysis and randomized algorithms.

Syllabus

Module – I

Introduction: The role of algorithms in computing, Growth of Functions: Asymptotic notations; Standard notations and common functions; Methods for solving recurrences: The substitution method, The recurrence – tree method, The master method.

Amortized Analysis: Aggregate, Accounting and Potential Methods. **9 hours**

Module – II

Graph Algorithms: Introduction to Single – Source shortest paths: Variants, negative weight edges, Cycles, Representing Shortest paths, Relaxation, Bellman - Ford Algorithm; Single source shortest paths in a DAG; Dijkstra's algorithm, Johnson's algorithm.

Maximum Flow: Flow networks and Ford-Fulkerson method; Maximum bipartite matching

9 hours

Module – III

Number -Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing.

8 hours

Module – IV

String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms. **7 hours**

Module – V

Polynomials and the FFT: Representation of polynomials, The DFT and FFT, Efficient implementation of FFT. **7 hour**

Laboratory

Note: The following programs can be executed on C/C++ .

1. Design, develop, and run a program to implement the Bellman-Ford algorithm
2. Design, develop, and run a program to implement a Monte Carlo algorithm to test the primality of a given integer.
3. Design, develop, and run a program to solve modular linear equations.
4. Design, develop, and run a program to solve string matching problem using naïve approach and the KMP algorithm.
5. Design, develop, and run a program to solve String matching problem using Finite Automata
6. Design, develop, and run a program to solve String matching problem using Robin Karp algorithm.

Course Outcomes

On completion of this course, the students will be able to

1. Explain different asymptotic notations and their use in modern computing systems.
2. Design and apply iterative and recursive algorithms.
3. Design and implement graph and flow network algorithms.

4. Design and analyze the algorithms for string matching.
Describe the representation of polynomials, the DFT and also the implementation of FFT.

Text Books:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, (Chapters 1,3,4,17,24,25,26,30,31,32),Prentice-Hall of India, 3rd Edition, 2010, ***ISBN***: 9780262259460
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, (Chapters 1,11,20), Cengage Delmar Learning, India. 2002, ***ISBN:*** *9788131505212*

Reference:

1. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ***ISBN***: 9788173716126

E-Resource:

1. http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap02.htm
2. http://www.cs.cornell.edu/courses/cs3110/2011sp/lectures/lec20-amortized/amortized.htm
3. http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap18.htm
4. https://en.wikipedia.org/wiki/Category:Graph_algorithms
5. http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap18.htm
6. http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap33.htm
7. https://en.wikipedia.org/wiki/String_searching_algorithm

OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI552	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 Hours**	**FE**

Course Objectives:

This course will enable the students to:

- Understand the basic concepts of Java Technology and its features.
- Get a clear understanding of the OOPs concepts.
- Be able to write programs in Java.
- Be able to effectively use data structures like Collections, Lists, etc.
- Be able to write defensive programming using Exception Handling.

Syllabus

Module – I

Introduction to Java: Why Java, Flavors of Java, Java Designing Goal and Features, JVM / JDK / JRE / History of JDK / JDM, Usage of IDE (Eclipse, NetBeans)
Language Fundamentals: Data Types - Variables, keywords, operators; Selection / Iterative / Decision making statements
Introduction to OOPs Concepts: Inheritance - Polymorphism - Abstraction – Encapsulation
10 hours

Module – II

Arrays and Strings: Defining of an Array, Initializing and accessing an Array, Multi-Dimensional Array, String / StringBuffer / StringBuilder
OOPs in Java: Inheritance, Abstract class and interface, Abstract class Vs Interface
Packages and Wrapper Classes: Defining Package, Organizing Classes and interfaces in Packages, Package as

Access Protection, Import and Static Import, Naming Convention for packages, What is Wrapper Class, Why Wrapper, How to handle wrapper Classes. **10 hours**

Module – III

Exception Handling: What is Exception, Types of Exception, Exception Hierarchy, Custom excpetions.
The Collection Framework: Collection of objects, Collection Interfaces and Hierarchy, List and Map, Types of List, Types of Map, Iterator, Generics. **8 hours**

Module – IV

Threads: Understanding Threads, Needs of Multi-Threaded Programming, Thread Life-cycle, Synchronizing Threads. **2 hours**

Module – V

Project Work: To create a Contact Book application using the Core Java concepts learnt with special emphasis on OOPs concepts, Exception Handling, and Collections Framework. **10 hours**

Laboratory

1. Programs covering Data Types and OOPs Concepts.
2. Programs covering Arrays and Strings, OOPS concepts in Java, Packages and Wrapper Classes.
3. Programs covering Exception Handling, The Collection Framework and Threads.

Course Outcomes: At the end of the course students will be able to:

- Understand the basic concepts of Java Technology and its features.
- Get a clear understanding of the OOPs concepts.
- Able to write programs in Java.
- Able to effectively use data structures like Collections, Lists, etc.
- Able to write defensive programming using Exception Handling.

Text Books:

1. Java: The Complete Reference; Herbert Schildt; McGraw Hill Education; Ninth edition; ISBN-10: 9339212096
2. Core Java: An Integrated Approach; Dr. R. Nageswara Rao; Dreamtech Press; First edition (2016); ISBN-10: 9351199258

Reference Books:

1. Effective Java; Joshua Bloch; Pearson Education; Second edition; ISBN-10: 933257653X
2. Core Java - Vol. I - Fundamentals; Cay S. Horstmann; Pearson Education; Tenth edition; ISBN-10: 9332582718

COMPUTER GRAPHICS (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSI553	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FE**

Course Objectives:

This course will enable the students to:

- Understand the basic principles of Computer graphics using OpenGL libraries
- Learn methods to implement the algorithms and techniques necessary to produce basic 2D and 3D objects
- Acquire knowledge on Graphical user interface
- Study various operations on 2D and 3D objects like translation, scaling and rotation
- Understand how to produce realistic images by position the camera coordinates, viewing angles, light and shade

Syllabus

Module – I

Introduction to Computer Graphics: What is computer graphics?, Where computer graphics is used, Elements of pictures created in computer graphics, graphics display devices, graphics input primitives and devices. **Initial steps in drawing figures**: To get started making pictures, the OpenGL basic graphics primitives, line drawing in OpenGL, simple interaction with mouse and keyboard, designing menus. **Additional drawing tool:** Introduction, world windows and viewports. **10 Hours**

Module – II

From vertices to fragments: Basic Implementation Strategies; Four major tasks; Clipping; Line-segment clipping; Polygon clipping; Rasterization; Bresenham's algorithm; Polygon Rasterization; Hidden-surface removal; Antialiasing; Display considerations. **7 Hours**

Module – III

Transformation of objects: Introduction to transformations, 3D affine transformations, how to change coordinate systems, affine transformations used in a program, to draw 3D scenes with OpenGL, **Modelling shapes with polygonal meshes:** Introduction to solid modelling with polygonal meshes. **8 Hours**

Module – IV

Three Dimensional Viewing: The camera revisited, to specify a camera in a program, perspective projection of 3D objects, to produce stereo views, taxonomy of projections. **7 Hours**

Module – V

Rendering faces for visual realism: Introduction, introduction to shading models, flat shading and smooth shading, adding hidden surface removal, to add texture to faces, to add shadows of objects, OpenGL 2.0 & the shading language(GLSL) **8 Hours**

Laboratory

Part-A

1. Plotting functions using dot plots
2. Drawing the checkerboard
3. Draw rubber rectangles: those that grow and shrink as the user moves the mouse
4. Cohen Sutherland line clipping algorithm
5. 3D scene rendered with shading

Part-B

Develop a suitable graphics package to implement the skills learnt in the theory and the exercises indicated in Part-A. Use the OpenGL libraries

Course Outcomes: On completion of this course, the student will be able to:

- Design simple graphical user interface using OpenGL libraries
- Implement basic 2D and 3D object using various rasterization and filling algorithms
- Perform various transformation on 2D and 3D objects.

- Apply camera coordinate and decide the viewing angles for 2D and 3D objects.
- Apply light and shading to render faces for visual realism

Text Books:

1. F.S. Hill, Jr, Stephen M. Kelley: Computer Graphics Using OpenGL (Chapter 1, 2, 3.1,3.2,5,6.2,7,8),3rd Edition, Pearson Education, 2009, ISBN 978-81-317-2414-9.
2. Edward Angel: Interactive Computer Graphics A Top-Down approach with OpenGL (Chapter 7), 5th Edition, Pearson Education, 2009, ISBN:978-81-317-2530-6.

Reference Books:

1. James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Pearson Education 1997.
2. Donald Hearn and Pauline Baker: Computer Graphics - OpenGL Version, 3rd Edition, Pearson Education, 2004.

E-Resources:

1. http://www.nptelvideos.in/2012/11/computer-graphics.html
2. https://www.tutorialspoint.com/computer_graphics/
3. www.graphics.cornell.edu/online/tutorial/

OPERATIONS RESEARCH					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST561	**3:0:0:0**	**3**	**CIE:50 SEE:50**	**3 hours**	**EE**

Course Objectives:

This course will enable students to:

- Understand quantitative methods and techniques for effective decision- making, model formulation and applications that are used in solving real world problems.
- Know the various techniques of OR, their applications and the relationship between a linear program and its dual.
- Learn different types of transportation and assignment models for optimization.
- Understand techniques that are used to plan, schedule and monitor large projects such as building construction, maintenance of computer system, research and development design etc.
- Acquire knowledge on decision making techniques under conflicting situations where there are one or more opponents.

Syllabus

Module – I

Introduction, Linear Programming: Introduction: The Origins , Nature and Impact of OR; Defining the Problem and Gathering Data; Formulating a Mathematical Model; Deriving Solutions from the Model; Testing the Model; Preparing to Apply the Model; Implementation.

Linear Programming: Prototype Example; The Linear Programming Model; Assumptions of Linear Programming; Additional Examples **8 hours**

Module – II

The Simplex Method: The Essence of the Simplex Method; Setting Up the Simplex Method; The Algebra of the Simplex Method; The Simplex Method in Tabular Form; Tie Breaking in the Simplex Method; Adapting to Other Model Forms;.

Duality Theory: The Essence of Duality Theory; Primal-Dual Relationships; Adapting to Other Primal Forms; The Dual Simplex Method. **8 hours**

Module – III

Transportation and Assignment Problems: The Transportation Problem;; The Assignment Problem. **8 hours**

Module – IV

Project Management with PERT/CPM: A Prototype Example--- The Reliable Construction Co. Project; Using a Network to Visually Display a Project; Scheduling a Project with PERT/CPM; Dealing with Uncertain Activity Durations; Considering Time-Cost Trade-Offs; Scheduling and Controlling Project Costs; An Evaluation of PERT/CPM. **8 hours**

Module – V

Game Theory, Decision Analysis: Game Theory: The Formulation of Two-Person, Zero-Sum Games; Solving Simple Games--A Prototype Example; Games with Mixed Strategies; Graphical Solution Procedure; Solving by Linear Programming; Extensions.

Decision Analysis: A Prototype Example; Decision Making without Experimentation; Decision Making with Experimentation; Decision Trees. **8 hours**

Course Outcomes

On completion of this course, the students will be able to:

- Develop Linear Programming models, interpret the models, solutions and infer solutions to the real-world problems.
- Solve the Linear problems by applying different techniques of Operations research.
- Build and solve Transportation models and Assignment models.
- Design new simple models like CPM to improve decision making and use critical path analysis,

programming evaluation and review techniques for timely project scheduling and completion.

- Compare the characteristics of different types of decision making environments and the appropriate decision making approaches and tools to be used in each type

Text Books:

1. Frederick S. Hillier and Gerald J. Lieberman: Introduction to Operations Research: Concepts and Cases, 8th Edition, Tata McGraw Hill, 2005, ISBN-13:978-0-07-060092-8. (Chapters: 1.1 to 1.3, 2, 3.1 to 3.4, 4.1 to 4.6, 6.1 to 6.4, 7.1, 8,10, 14.1 to 14.6, 15.1 to 15.4)

Reference Books:

1. S D Sharma: Operations Research, KedarNath Ram Nath, 2007
2. Hamdy A Taha: Operations Research: An Introduction, 8th Edition, Pearson Education, 2007, ISBN:81-203-2235-5
3. Richard Bronson, Govindasami Naadimuthu: Operations Research, SCHAUM'S outlines, 2nd Edition, TATA McGRAW-HILL Edition, ISBN-13:978-0-07-058400-6, ISBN-10:0-07-058400-1

E-Resources:

1. www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html2.
2. www.freevideos.com/courses/2678/advanced-operations-research

COMPUTER NETWORKS LABORATORY					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSL57	**1-0-2-0**	**2**	**CIE:50 SEE:50**	**3 hours**	**EE**

Course Objectives:

This course will enable students to:

- Become familiar with the working of network topology.
- Understand working of Ethernet LAN.
- Understand the concepts of mobile routing.
- Become familiar with the basics of TCP/IP.
- Understand the concepts of network security.

Part A

Simulation Exercises

The following experiments shall be conducted using either NS228/OPNET or any other suitable simulator.

1. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.

2. Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

3. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

4. Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.

5. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.

6. Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

Part B

Implement the following in C/C++:

7. Write a program for error detecting code using CRC-CCITT (16- bits).
8. Write a program for distance vector algorithm to find suitable path for transmission.
9. Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
10. Implement the above program using as message queues or FIFOs as IPC channels.
11. Write a program for simple RSA algorithm to encrypt and decrypt the data.
12. Write a program for congestion control using leaky bucket algorithm.

Course Outcomes

On completion of this course, the students will be able to

- Analyse the working of network devices.
- Differentiate packet managements at different levels.
- Apply the knowledge of security algorithms.
- Discover shortest path using routing algorithms.

- Demonstrate the working of wireless networks.

Text Books:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, July 2012, ISBN : 978-0-07-337622-6
2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks -Fundamental Concepts and Key architectures, 2nd Edition Tata McGraw-Hill, 2004, reprint 2007. ISBN-13 : 978-0-07-059501-9
3. Nader F. Mir: Computer and Communication Networks, 2nd Edition, Pearson Education, 2015, ISBN : 0133814742

E- Resources:

1. https://archive.org/details/Data.Communications.and.Networking.5th.Edition
2. https://doc.lagout.org/network/Data%20Communications%20and%20Networking%20By%20Behrouz%20A.Forouzan.pdf
3. http://ptgmedia.pearsoncmg.com/images/9780133814743/samplepages/9780133814743.pdf

OPERATING SYSTEM LABORATORY					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSL58	**1-0-2-0**	**2**	**CIE:50 SEE:50**	**3 Hours**	**FC**

Course Objectives:

This course will enable students to:

- Learn different types of operating systems
- Learn the concept of CPU scheduling algorithms used in operating system.
- Understand Bankers algorithm used for deadlock avoidance and prevention.
- Learn the concept of Inter process Communication
- Gain knowledge of Producer Consumer Problem.

Syllabus

Note: **The following programs can be executed on C/C++ any equivalent language or tool with suitable platform.**

1. Write a program to simulate the Round Robin Scheduling algorithm.
2. Write a program to implement the Shortest Job First algorithm.
3. Write a program to implement the First come First Serve algorithm.

4. Write a program to implement the Priority Scheduling algorithm.
5. Design Develop and run a program to implement Banker's algorithm.
6. Write a Program to implement Inter process Communication using Pipes.
7. Write a Program to implement Producer Consumer Problem.
8. Installation of Operating systems.

Course Outcomes

On completion of this course, the students will be able to:

- Explain different types of operating systems and installation process.
- Implement CPU scheduling algorithms used in operating system.
- Implement Bankers algorithm used for deadlock avoidance and prevention.
- Design and implementation of Inter process Communication
- Solve Producer Consumer Problem.

Reference Books:

1. D.M Dhamdhere: "Operating systems - A concept based Approach", Tata McGraw- Hill, 2nd Edition, 2002. ISBN: 978–0–07–295769–3
2. P.C.P. Bhatt: "Introduction to Operating Systems: Concepts and Practice", PHI, 4th Edition, 2008. ISBN: 978-81-203-4836-3
3. Harvey M Deital: "Operating systems", Pearson Education, 3rd Edition, 1990. ISBN 978-0131828278

E-Resources:

1. http://nptel.ac.in/courses/106108101/
2.http://study.com/academy/lesson/computer-operating-systems-managing-hardware-and-software-resources.html

UNIX SYSTEM PROGRAMMING					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST61	**3-0-0-0**	**3**	**CIE:50 SEE:50**	**3 Hours**	**FC**

Course Objectives:

This course enable students to :

- Learn about the UNIX and POSIX standards.
- Become familiar with files and process.
- Understand the different APIs and details of Unix processes.
- Become familiar with handling fork function and race condition.
- Learn about inter process communication between client and server.

Syllabus

Module – I

Introduction: UNIX and ANSI Standards: The ANSI C Standard, The POSIX Standards, UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics. **UNIX Files:** File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.

8 Hours

Module – II

UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. **UNIX Processes:** Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables. **8 Hours**

Module – III

Process Control: UNIX Kernel Support for Processes. Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, Race Conditions, exec Functions, Interpreter Files, system Function, Process Accounting, User Identification, Process Times. **Process Relationships:** Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control.

8 Hours

Module – IV

Signals and Daemon Processes: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, Kill, Alarm, Interval Timers, **Daemon Processes:** Introduction, Daemon Characteristics, Coding Rules, Error Logging.

Inter process Communication – 1: Introduction, Pipes, popen, pclose Functions, Coprocesses, FIFOs.

8 Hours

Module – V

Inter process Communication – 2: System V IPC: Message Queues, Semaphores, Shared Memory.

NETWORK IPC: SOCKETS: Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer; Socket options; Out-of-band data; Nonblocking and asynchronous I/O. **8 Hours**

Course Outcomes:

On completion of this course, the students will be able to :

- Write the programs using UNIX/POSIX standards.
- Describe Unix APIs functions and Files.
- Analyse zombie process and job control.
- Explain UNIX kernel support for signals.
- Design and develop various IPC methods.

Text Books:

1. Terrence Chan: "UNIX System Programming Using C++", (Chapters 1.1, 1.4, 1.6, 5, 6, 7.1 to 7.6), Prentice Hall India, 1st edition, 1999. ISBN-9780133315622
2. Stephen A. Rago: "Advanced Programming in the UNIX Environment – W. Richard Stevens", (Chapters 7, 8.1 to 8.6, 8.9, 8.10, 8.12 to 8.16, 9.1 to 9.8, 13.1 to 13.4,15.1 to 15.9, 16), Pearson Education / PHI, US, 2nd Edition, 2005. ISBN-978-0321637734

Reference Books:

1. Marc J. Rochkind: "Advanced UNIX Programming", Pearson Education, 2nd Edition, 2005.
2. Maurice J Bach: "The Design of the UNIX Operating System", Pearson Education,1st edition, 1987.
3. Uresh Vahalia: "UNIX Internals: The New Frontiers", Pearson Education, 1st edition, 2001.

E-Resources:

1. http://weshakucysysh.comunidades.net/unix-systems-programming-communication
2. https://www.pearson.com/us/higher-education/program/Rochkind-Advanced-UNIX-Programming-2nd-Edition/PGM155399.html
3. http://www.ewitedu.in/k_course/usp6/

SYSTEM SOFTWARE					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CST62	**3-0-0-0**	**3**	**CIE:50 SEE:50**	**3 Hours**	**FC**

Course Objectives:

This course will enable students to:

1. Learn fundamentals of system software.
2. Gain knowledge about system software tool like assemblers.
3. Understand the working of loaders and editors.
4. Learn macroprocessors and its design.
5. Study the concepts of Lex and Yacc programming**.**

Syllabus

Module – I

Machine Architecture: Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples.
Assemblers -1: Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes.
8 hours

Module – II

Assemblers-2: Program Relocation, Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations - One-Pass Assembler, Multi-Pass Assembler. **8 hours**

Module – III

Loaders and Linkers: Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader;
Editors and Debugging Systems: Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities.
8 hours

Module – IV

Macro Processor: Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Options - Recursive Macro Expansion
8 hours

Module – V

Lex and Yacc – 1: Lex and Yacc - The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running LEX and YACC, LEX and Hand- Written Lexers, Using LEX -Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line.
8 hours

Course Outcomes

On completion of this course, the students will be able to :

1. Acquire the basic concepts of system software.
2. Acquire skills with the working principle of one pass and multi-pass assembler, etc.
3. Analyze the function of loaders and editors.
4. Analyze the concepts of macroprocessors.
5. Design and develop lex and yacc programming.

Text Books:

1. Leland.L.Beck: System Software, 3rdEdition, Pearson Education, 1997, (Chapters 1.1 to 1.3, 2 (except 2.5.2 and 2.5.3), 3 (except 3.5.2 and 3.5.3), 4 (except 4.4.3))
ISBN 10: 817758555 ISBN 13: 9788177585551
2. John.R.Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD, 1998 , (Chapters 1, 2 (Page 2-42), 3 (Page 51-65)) ISBN 1565920007, 9781565920002.

Reference Books:

1. D.M.Dhamdhere: System Programming and Operating Systems, 2ndEdition, Tata McGraw - Hill, 1999. ISBN-13: 978-0072957693 ISBN-10: 0072957697

E-Resource:

1. https://en.wikipedia.org/wiki/System_software
2. https://techterms.com/definition/systemsoftware
3. www.computerhope.com/jargon/s/systsoft.html
4. https://en.wikibooks.org/wiki/A...Program...Systems/System_software
5. https://www.techopedia.com/definition/5476/system-software

EMBEDDED SYSTEMS (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSI63	**3:0:2:0**	**4**	**100**	**3 hours**	**FC**

Course Objectives:

This course will enable students to:

1. Obtain a broad understanding of the embedded system technologies and applications of embedded systems
2. Understand the communication buses for device networks of embedded systems.
3. Have a basic knowledge on the various issues involved in real-time operating systems.
4. Know how these systems can handle the tasks and scheduling of the tasks
5. Learn about embedded systems associated design and software development tools.

Syllabus

Module – I

INTRODUCTION TO EMBEDDED SYSTEMS

Embedded systems; Processor embedded into a system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded System-on-Chip (SoC), Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer. **10Hrs**

Module – II

COMMUNICATION BUSES FOR DEVICE NETWORKS

Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols. **07Hrs**

Module – III

REAL TIME OPERATING SYSTEMS 1

Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment and handling of interrupt source calls. **08Hrs**

Module – IV

REAL TIME OPERATING SYSTEMS 2

Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues.
08Hrs

Module –V

EMBEDDED SOFTWARE DEVELOPMENT TOOLS

Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools. **07Hrs**

List of Lab programs**12Hrs**

1. Intrusion detection in TCP/IP networks using immune systems paradigm and neural network detectors
2. Network Tapping System Based on Customized Embedded Linux: Design and Implementation
3. Network Intrusion Detection System Based on Embedded System - Off-line and On-line NIDS Based on Embedded System: Design and Implementation
4. Packet Features Extractor for Network Security Systems: Design and Implementation
5. Draft of Design and Implementation FSK Remote Control System Using ATmiga16 Microcontroller
6. Text Code of Tx Rx remote control ATmiga16 Microcontroller

Course Outcomes:

On completion of this course, the students will be able to :

1. Describe the embedded system technologies and applications of embedded systems
2. Differentiate communication buses for device networks of embedded systems
3. Solve issues involved in real-time operating systems.
4. Manage tasks scheduling of embedded systems.
5. Design and software development tools.

Text Books:

Embedded Systems: Architecture, Programming and Design, Raj Kamal, Tata McGraw-Hill Education, 2011 - Embedded computer systems, ISBN 10- 0-070-66764-0, 13-978-0-070-66764-8, Chapters 1,2,3,4,5,7,8,9,11,12

Reference Books:

Shibu K V: Introduction to Embedded Systems, Tata McGraw Hill, 2009. ISBN 10: 0070678790 Chapters 1,2,4,6,7,8,9,10

E-Resources:

http://info300.net/skhouri/sources.html

http://embedded-computing.com/articles/safety-security-and-source-code-for-industrial-embedded-systems-no-shortcuts/

DATA MINING (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSI641	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FE**

Course Objectives:

This course will enable students to:

- Understand the basic concepts, different types of data and data pre-processing methods.
- Understand the basic concepts and algorithms in association mining.
- Understand the different classification techniques.
- Identify the accuracy of diverse classifiers and predictors.
- Identify the appropriate clustering techniques for the given data sets.
- Familiarize with the various applications of Data Mining.

Syllabus

Module – I

Data Mining: Introduction, Challenges, Data Mining Tasks, Types of Data, Data Quality-Measurements and data collection errors, precision, bias, accuracy, missing value, inconsistent values, noise and artifacts, outliers, duplicate data, Data Preprocessing- aggregation, sampling, dimensionality reduction, discretization and binarization, Variable transformation.

8 Hours

Module – II

Association Analysis: Association Analysis- Basic Concepts & Algorithms: Frequent Item set Generation. Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluation of Association Patterns–Objective Measures of Interestingness. **8 Hours**

Module – III

Classification: Basics, General approach to solve classification problem, Decision Trees Induction, Rule based classifiers, Nearest Neighbour Classifiers, Bayesian Classifiers, Artificial Neural Networks (ANN).

8 Hour

Module – IV

Clustering Techniques: Overview, Features of cluster analysis, Types of Data & Computing Distance (Measures of Similarity &Dissimilarity), Different types of Clustering, Different types of clusters, K-means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation-Overview. **8 Hours**

Module – V

Mining different types of data: Text Mining-Text data analysis &informational retrieval, text mining approaches, Mining the world wide web-Mining web page layout structure, Mining web's link structures, Web usage mining. Applications: Finance, Retail Industry, Intrusion detection.

8Hours

Laboratory

Part – A

1. Working with the Weka tool/ Rapid Miner Tool/R Tool

Step 1: Dataset Creation

Step 2: Preprocessing

The preprocessing techniques that can be applied are as follows:

a. Handling of Missing values for categorical and numerical values

b. Redundancy Techniques.

Step 3: Perform the following on the preprocessed dataset:

a. Association mining
b. Decision Tree Classification
c. Naïve Bayes Classification

PART - B

1. Write a java/C++ program to perform aggregation and discretization on a given dataset.
2. Write a java/ C++ program to identify the frequent subsets from a frequent item set.
3. Write a java/ C++ program to identify strong rules from a set of rules given the confidence and support thresholds.
4. Write a java/ C++ program to implement the information gain and gini index measures to identify the best attribute to split.
5. Write a java/ C++ program to construct a Naïve Bayesian classifier for a given dataset.
6. Write a java/ C++ program to perform k-means clustering on numeric dataset.

Course Outcomes

On completion of this course, the students will be able to:

- Illustrate the data and various data reprocessing techniques.
- Design association mining approaches and analyze them.
- Design data classification methods and measures for evaluation.
- Generate clusters from the data using similarity measures.
- Apply data mining approaches in text and web and identify the applications of data mining.

Text Books:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson Education, 2005. 2. Jiawei Han and Micheline Kamber: (Chapters 1,2.1,2.2,2.3,4.1,5.1-5.4,6.1-6.7,8.1-8.5,10.3,10.4,10.5)Pearson Education, 2005. ISBN 032-132-1367

2. Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006 (Chapters 10.3,10.4,10.5) ISBN-978-81-312-0535-8.

Reference Books:

1. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009. ISBN *978-8120330535*

E-Resources:

1. www-users.cs.umn.edu/~kumar/dmbook.
2. www.cs.ccsu.edu/~markov/ccsu_courses/datamining-1.html.
3. https://www.pearson.com/us/higher...Introduction-to-Data-Mining/PGM93748.html

DATABASE CONCEPTS

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI642	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to:

- Understand the basic concepts of database and Database Management System and difference between relational systems and non-relational systems.
- Get a clear understanding of how to create and maintain data in a relational database.
- Understand the working of advanced queries in SQL.
- Understand how Java programs can access database management systems using JDBC.
- Get a clear understanding of how to design and develop applications using Java, JDBC and SQL.

Syllabus

Module – I

Introduction to Database: Introduction, Characteristics of database approach, Advantages of using the DBMS approach. **Database System concepts and architecture:** Data Models, Schemas, and Instances, Three schema architecture and Data independence. **Data Modelling using Entities and Relationships Model:** Entity types, Entity sets, attributes and keys, relationship, constraints, ER diagrams.

8 hours

Module – II

Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas.**SQL:** SQL data definition and data types, specifying constraints in SQL, schema change statements in SQL, INSERT, DELETE, and UPDATE statements in SQL, assertions, views, queries.

8 hours

Module – III

More complex SQL retrieval queries: Nested queries, Correlated nested queries ,The EXISTS and UNIQUE function in SQL, Joins , Aggregate functions in SQL, Grouping: Group by and Having clauses. **8 hours**

Module – IV

JDBC: JDBC API and Driver types, Overview of JDBC process, Statement / Prepared Statements / Callable Statements, Result Set, CRUD operations. **8 hours**

Module – V

Project Work: To create a Banking application/Library Management/Student database Management/Bus Reservation application using the concepts of database management systems with special emphasis on Java, JDBC, and MySQL database. **8 hours**

Laboratory

1. Programs covering SQL, Constraints, Operators and Functions, Joins, Inner queries, Co-related queries.
2. Programs covering JDBC concepts.

Course Outcomes

On completion of this course, the students will be able to:

- Understand the basic concepts of database and Database Management System , enforce integrity constraints on a database using RDBMS.
  - Use Structured Query Language (SQL) for database creation and manipulation.
- Use Structured Query Language (SQL) to implement complex queries.
  - Understand how Java programs an access database management systems using JDBC.
- Design database systems for some application to interact with databases using Java, JDBC and Database to save and retrieve data in a safe and consistent manner.

Text Books:

1. Fundamentals of Database Systems; Ramez Elmasri and Shamkant B. Navathe;Pearson; 5thEdition; ISBN 978-81-317-1625-0.
2. J2EE:The Complete Reference; jim Keogh;Mc Graw Hill Education(India) edition 2002; ISBN 978-0-07-052912-0

Reference Books:

1. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, Mc-GrawHill, 2013.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.

SOFT COMPUTING (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSI643	**3-0-2-0**	**4**	**CIE:50 SEE:50**	**3 Hours**	**FE**

Course Objectives:

This course will enable students to:

- Learn the fundamentals and major concept of Soft Computing and Neural Network.
- Study various architecture and phases of Neural Network.
- Extend the knowledge of Fuzzy Logic, Genetic Algorithms
- Study the concepts of hybrid Systems
- Leaning necessity in engineering field.

Syllabus

Module – I

Introduction: Introduction to Soft Computing, Historical Development, Definitions, advantages and disadvantages, solution of complex real life problems. **7 Hours**

Module – II

Neural Network: Introduction – Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network. Supervised Learning Network: Perceptron Networks – Adaline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network.

9 Hours

Module – III

Fuzzy Logic: Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Noninteractive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods. **7 Hours**

Module – IV

Genetic Algorithms: Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach- Genetic Algorithm based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control. **9 Hours**

Module –V

Hybrid Systems: Genetic Algorithm based Backpropagation Network, Fuzzy – Backpropagation, Fuzzy Logic Controlled Genetic Algorithms. **7 Hours**

Laboratory

List of Experiments: (Work in Computation lab)

1. Problems based on GA and its applications in transportation.
2. Problems based on Fuzzy logic and its applications in transportation.
3. Problems based on ANN and its applications in transportation.
4. Problems based on hybrid systems and its application in transportation.

Design based Problems (DP)/Open Ended Problem:

1. Solving routing problem of mass transit system using GA
2. Developing trip generation relationship using ANN

3. Developing mode choice model using Fuzzy Logic
4. Obtaining optimal mix design of Bituminous Concrete using GA or Hybrid system

Course Outcomes: At the end of the course students will be able to:

- Implement the knowledge of Neural Network.
- Implement Fuzzy Sets, fuzzification, defuzzification.
- Design solutions for problems regarding probability, Mutation of crossover, convergence and Encoding.
- Use the soft computing techniques for daily problems.
- Implementation of soft computing and importance in engineering field.

Text Books:

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, (Chapters 1-15), Wiley India, 2007, ISBN: 10: 81-265-1075-7.
2. "Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", by S. Rajasekaran and G.A. Vijayalakshmi Pai, (2005), Prentice Hall, Chapter 1-15, page 1-435.ISBN 8120321863
3. Sinha, N.K. and Gupta, M. M.: "Soft Computing and Intelligent Systems Theory and Applications",(2000) Academic Press, Chapter 1-25, page 1-625. ISBN 10: 0126464901 ISBN 13: 9780126464900.

Reference Books:

1. "Soft Computing and Intelligent Systems Design - Theory, Tools and Applications", by Fakhreddine karray and Clarence de Silva (2004), Addison Wesley, chapter 1-10, page 1-533.
2. Klir, G. J. and Yuan, B.: "Fuzzy Sets and Fuzzy Logic: Theory and Applications",(1995) Prentice Hall.

E-Resources:

1. https://link.springer.com/referenceworkentry/10.1007/978-0-387-30440-3_15
2. http://www.faadooengineers.com/threads/9513-Soft-computing-full-notes-pdfs-ebooks

ARTIFICIAL INTELLIGENCE

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST651	3-0-0-0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to

- Apply a given AI technique to a given concrete problem
- Implement non-trivial AI techniques to handle complex problem
- Understand uncertainty and Problem-solving techniques.
- Understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent.
- Understand different logical systems for inference over formal domain

Syllabus

Module – I

Introduction: What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies. **9 Hours**

Module – II

Informed Search, Exploration, Constraint Satisfaction, Adversial Search:

Informed search strategies; Heuristic functions; On-line search agents and unknown environment. Constraint satisfaction problems; Backtracking search for CSPs. Adversial search: Games; Optimal decisions in games; Alpha-Beta pruning.

8 Hours

Module – III

Logical Agents: Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

7 Hours

Module – IV

First-Order Logic, Inference in First-Order Logic – 1: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting **8 Hours**

Module – V

Inference in First-Order Logic – 2: Forward chaining; Backward chaining; Resolution. **8 Hours**

Course Outcomes: After completion of this course, the students will be able to:

- Design intelligent agents for solving simple gaming by using artificial intelligence
- Apply non-trivial AI techniques to handle complex problems.
- Apply various symbolic knowledge representation to specific problems.
- Design Knowledge-based agents.
- Understand syntax and semantics of first-order logic.
- Understand inference in first order logic.

TEXT BOOKS:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003. (Chapters 1.1, 2, 3.1 - 3.4, 4.1, 4.2, 4.5, 5.1, 5.2, 6.1- 6.3, 7, 8, 9, 10, 11.1, 11.2, 11.4, 11.5, 13.1, 13.4, 13.5, 13.6,) **ISBN** 0-13-103805-2.

REFERENCES :

1. Elaine Rich, Kevin Knight: Artificial Intelligence, 3rd Edition, Tata McGraw Hill, 2009. ISBN 10: 0070087709
2. Nils J. Nilsson: Principles of Artificial Intelligence, Elsevier, 1980 ISBN 978-3-540-11340-9.

E-Resources:

1.http://stpk.cs.rtu.lv/sites/all/files/stpk/materiali/MI/Artificial%20Intelligence%20A%20Modern%20Approach.pdf.
2. http://www.getfreeebooks.com/16-sites-with-free-artificial-intelligence-ebooks/

YOGA AND MEDITATION					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17HOE662	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3 hours**	**OE**

Course Objectives:

This course will enable students to:

- Introduce the main principles of Yoga.
- Generate knowledge and skills of students to use the tools and techniques for using Yoga in day to day life for better health and well being.
- Improve communication and increase concentration through Yoga and Meditation.
- Equip the individual to handle stressful situations and manage day to day activities.

Syllabus

Module – I

Definition and meaning of yoga, Meaning of Asanas, Types of Asanas: standing, sitting and supine asanas. Standing Asanas(Trikon asan, padhastasan, ardhachakrasan, veerbhadrasan), Sitting Asanas(Vajrasan, padmasan, suptavajrasan, Ardhamaschendrasan, vakrasan) Supine Asanas(Sarvangasan, Matsyasan, Natarajasan,Shavasan) **8hours**

Module – II

Patanjali's Yoga Sutra: Eight limbs of yoga, Importance of discipline in Yoga, Stillness of mind, Five Modulations (vritti) of the mind, Practice and Dispassion, Obstacles in the path of Yoga, Overcoming distractions of the mind through Yoga. **8 hours**

Module – III

Understanding physiological implications of Yoga, Three types of Gunas (Satva, Rajas and Tamas) and their effects on body and mind, Food Habits, Meaning of Prana, Pranayama and its advantages, Different types of Pranayama. **8 hours**

Module – IV

Ayurveda: The science of life, Three types of doshas (Vata, Pitta and Kapha), Balancing the different doshas for a healthy life, Ayurvedic principles of food and activity, Advanced Asanas: Mayurasana, Sirsasana, Gomukh Asana, Vrkshasana, Baddha Konasana. 8 hours

Module – V

Meditation: Meaning of meditation, Meditation vs Concentration, Advantages of Meditation, Effects of Meditation on body and mind, Effect on health and general well being, Reducing stress through meditation, Increasing concentration, Improving communication, Effect on Environment

8 hours

Course Outcomes:

At the end of the course students should be able to:

- Know the basic principles of Yoga.
- Know and practice the basic asanas and their benefits.
- Use Pranayama and Meditation for improving health and mental peace.
- Understand the difference between meditation and concentration.
- Understand the principles of Ayurveda and implement them for one's benefit.

Text Books:

1. Yoga Sutras of Patanjali (ancient text)
2. Light on Yoga by B K S Iyengar.

Reference Books:

1. A traditional touch to Yogasanas for beginners and Sadhakas, Swami Vivekananda Yoga Prakashana (SVYP)
2. Ayurveda: The Science of Self-Healing: A Practical Guide Dr. Vasant Lad.

MUSIC (CARNATIC VOCAL/INSTRUMENTAL)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE663	2:0:0:4	3	CIE:50 SEE:50	3 hours	OE

Course Objectives:

This course will enable students to:

- To familiarize the students with the conceptual understanding of Carnatic music.
- To make the students gain knowledge about the basics of Swaravalis.
- To make the students understand the use of different Talas.
- To gain understanding about various Raagas.
- To gain understanding about intricacies of Swaras.

Syllabus

Module – I

Theoretical Aspects : Father of Carnatic music, Famous personalities in Carnatic music, Concept of Sapta Swara, Taala, Melody, Pitch, Rhythm, Janaka Raaga, Janya Raaga. **3 Hours**

Module – II

Sarale Varase (Any 5), Janti Varase (Any 5), Daatu Varase, Tara Stayi, Mandra Stayi **8 Hours**

Module – III

Alankaras: Druva Taala, Matya Taala, Triputa Taala, Rupaka Taala, Jampe Taala, Atta Taala, Eka Taala **8 Hours**

Module – IV

Geethagalu, Pillari Geethe (4), Sanchari Geethe (5), Lakshana Geethe (1) **10 Hours**

Module – V

Swarajatis (Any 2), Kalyani, Bilahari, Neelambari, Kamach

Varna (Any 2), Shankarabarana, Kalyani, Hamsadwani , Mohana **10 Hours**

Course Outcomes:

At the end of the course students should be able to:

-

Text books:

1. Karnataka Sangeetha Darpana – Dr. Sachidevi (Sreenivasa Prakashana) Bengaluru 2014
2. Junior Carnatic Music – C Shiva Musicals,Malleshwaram,Bengaluru 2013

DANCE (BHARATA NATYA)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17HOE663	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3 hours**	**OE**

Course Objectives:

This course will enable students to:

- To gain theoretical knowledge about various types of Indian dances
- To gain understanding about various musical instruments used in Bharata Natya
- To learn Practical demonstrations of Bharata Natya steps on Prarthane Namaskara and Shlokas
- To learn the movements of head. Neck, eyes, hands according to Bharata Natya steps.
- To learn the brisk movements in Bharata Natya with the help of ADAVUS

Syllabus

Module – I

Indian Classical dance, It,s history and Significance, Types of Classical Dance, BharataNatya, Kathakali, Mohini Attam, Koochipudi, Katahak,Odissi, Manipuri **4Hours**

Module – II

Musical Instuments used in BharataNatya: Tabala, Mrudanga, Kamsale, Kolata, Taala vadya.
Famous personalities in BharataNatya, Composers of Natya Grantas. **3 Hours**

Module – III

Practical exercises on Prarthane, Namaskara and Shloka, Vyayama Kriye for BharataNatya
(Two Shlokas and Two Prarthanes) **10 Hours**

Module – IV

Abhinaya Steps (Chaturvidha) ShiroBedha, Drushti Bedha, Greeva Bedha, Brubedha, Hasta Bedha(Samyuta and Asamyuta) **10 Hours**

Module – V

Adavugalu (DashaVidha) Tattu adavu, Mettu Adavu, Nat Adavu, Egaru Tattu Adavu, Egaru Mettu adavu, Jaaru Adavu, Mandi adavu, TattuMettu Adavu, Rangakarma Adavu, Teermana Adavu
12 Hours

Course Outcomes:

At the end of the course students should be able to:

-

Reference Book

1. Bharata Natya shastra- Text book for Junior - Department of Public Instruction, Karnataka State Government

UNIX SYSTEM PROGRAMMING LABORATORY					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
17CSL67	**1-0-2-0**	**2**	**CIE:50 SEE:50**	**3 Hours**	**FC**

Course Objectives:

This course will enable students to:

- Use the UNIX environment efficiently.
- Develop program to know system configuration options.
- Learn inter process communication technique.
- Understand and use of UNIX APIs.
- Describe the race condition.

Syllabus

1. Write a C/C++ POSIX compliant program to check the following limits:
(i) No. of clock ticks
(ii) Max. no. of child processes
(iii) Max. path length
(iv) Max. no. of characters in a file name
(v) Max. no. of open files/ process
2. Write a C/C++ POSIX compliant program that prints the POSIX defined configuration options supported on any given system using feature test macros.
3. Consider the last 100 bytes as a region. Write a C/C++ program to check whether the region is locked or not. If the region is locked, print pid of the process which has locked. If the region is not locked, lock the region with an exclusive lock, read the last 50 bytes and unlock the region.
4. Write a C/C++ program which demonstrates inter process communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
5. a) Write a C/C++ program that outputs the contents of its Environment list
b) Write a C / C++ program to emulate the unix ln command
6. a) Write a C/C++ program to illustrate the race condition.
b)Modify the above program to avoid the race condition
7. Write a C/C++ program that creates a zombie and then calls system to execute the ps command to verify that the process is zombie.
8. Write a C/C++ program to avoid zombie process by forking twice.
9. Write a C/C++ program to implement the system function.
10. Write a C/C++ program to set up a real-time clock interval timer using the alarm API.

Course Outcomes: On completion of this course, the students will be able to:

- Implement POSIX feature test macros.
- Design system function.
- Examine emulation of ln command.
- Identify the zombie process.
- Design file and record locking concept.

E-Resources:

1. http://weshakucysysh.comunidades.net/unix-systems-programming-communication
2.https://www.pearson.com/us/higher-education/program/Rochkind-Advanced-UNIX-Programming-2nd-Edition/PGM155399.html
3. http://www.ewitedu.in/k_course/usp6/

Seventh Semester BE – Syllabus

Internet of Things (IoT) (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSI71	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FC**

Course objectives:

This course will enable students to:

- Vision and Introduction to IoT.
- Understand IoT Market perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.

- Understand State of the Art – IoT Architecture.
- Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Syllabus

Module – I

IoT and Web Technology: The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics. **8 hours**

Module – II

M2M to IoT – A Basic Perspective: Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **6 hours**

Module – III

M2M to IoT-An Architectural Overview: Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. **6 hours**

Module – IV

IoT Architecture - State of the Art: Introduction, State of the art.
Architecture Reference Model: Introduction, Reference Model and architecture, IoT reference Model.
IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **10 hours**

Module – V

IoT Applications for Value Creations: Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth. **10 hours**

Laboratory

1. Sketch the architecture of IoT Toolkit and explain each entity in brief.
2. Demonstrate a smart object API gateway service reference implementation in IoT toolkit.
3. Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.
4. Explain application framework and embedded software agents for IoT toolkit.
5. Explain working of Raspberry Pi.
6. Connect Raspberry Pi with your existing system components.
7. Give overview of Zetta.

Design based Problems (DP) / Open Ended Problem:

1. How do you connect and display your Raspberry Pi on a Monitor Or TV?

2. Create any circuitry project using Arduino.

Major Equipment:

1. Raspberry pi, Arduino

Course Outcomes:

On completion of this course, the students are able to:

- Understand the vision of IoT from a global context.
- Determine the Market perspective of IoT.
- Use of Devices, Gateways and Data Management in IoT.

- Understand the building state of the art architecture in IoT.
- Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Text Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, (Chapters 1, 2, 3, 4, 8, 9, 10), Academic Press, 2014, ISBN: 9780080994017.

Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

E-Resources:

- https://github.com/connectIOT/iottoolkit
- https://www.arduino.cc/
- http://www.zettajs.org/
- Contiki (Open source IoT operating system)
- Arduino (open source IoT project)

ANDROID APPLICATION DEVELOPMENT					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CST72	**2:0:0:0**	**2**	**CIE:50 SEE:50**	**3 hours**	**FC**

Course Objectives:

This course will enable students to:

- Describe the Android SDK features and the Development Framework and understanding Activities.
- Create adaptive, responsive user interfaces that work across a wide range of devices.
- Perform background work and long-running tasks in Android applications
- Know the concepts of Storing, sharing and retrieving data in Android applications
- Learn how permissions, security and performance affect application. Finally, make sure your app is ready to share with the world, and publish it.

Syllabus

Module – I

What Is Android?, Android Versions, Features of Android, Architecture of Android, Android Devices in the Market, The Android Market, Obtaining the Required Tools, Eclipse, Android SDK, Android Development Tools (ADT), Creating Android Virtual Devices (AVDs), Creating Your First Android Application, Anatomy of an Android Application. Understanding Activities, Applying Styles and Themes to Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog, Linking Activities Using Intents, Resolving Intent Filter Collision, Returning Results from an Intent**.** **5 Hours**

Module – II

Understanding the Components of a Screen, Views and View Groups, Linear Layout, Absolute Layout, Table Layout, Relative Layout, Frame Layout, Scroll View, Adapting to Display Orientation, Anchoring Views, Resizing and Repositioning, Managing Changes to Screen Orientation, Persisting State Information during Changes in Configuration, Detecting Orientation Changes, Controlling the Orientation of the Activity, Creating the User Interface Programmatically, Basic Views . **5 Hours**

Module – III

Using Image Views to Display Pictures - Gallery and Image View Views, Image Switcher, Grid View, Using Menus with Views - Creating the Helper Methods, Options Menu, Context Menu, Saving and Loading User Preferences - Using get Shared Preferences(), Using get Preferences(), Persisting Data to Files - Saving to Internal Storage, Saving to External Storage (SD Card), Choosing the Best Storage Option, Using Static Resources, Creating and Using Databases .

5 Hours

Module – IV

Sharing Data in Android, Using a Content Provider - Predefined Query String Constants, Projections, Filtering, Sorting, Creating Your Own Content Providers - Using the Content Provider. SMS Messaging - Sending SMS Messages Programmatically, Getting Feedback After Sending the Message, Sending SMS Messages Using Intent, Receiving SMS Messages, Updating an Activity from a Broadcast Receiver, Invoking an Activity from a Broadcast Receiver. **6 Hours**

Module – V

Creating Your Own Services - Performing Long-Running Tasks in a Service, Performing Repeated Tasks in a Service, Executing Asynchronous Tasks on, Separate Threads Using IntentService, Communicating between a Service and an Activity, Binding Activities to Services. Preparing for Publishing, Versioning, Digitally Signing Your Android Applications, Deploying APK Files - Using the adb.exe Tool, Using a Web Server, Publishing on the Android Market, Creating a Developer Profile, Submitting Your Apps. **5 Hours**

Course Outcomes

On completion of this course, the students will be able to:

- Comprehend the basic features of Android Platform and Create Activities in Android.

- Demonstrate the design concepts of user interface using components, views and menus in Android.
- Create and use databases for Android Application.
- Implement messaging services in Android.
- Deploy mobile applications in various marketplaces for distribution.

Text Books:

1. Wei – Meng Lee, Beginning Android Application Development, Wiley publications .(Chapters 1,2,3,4,5,6,7,8,10,11)
2. Reto Meier, Professional Android 4 Application Development, Wiley publications .

Reference Books:

1 .Mark Murphy; Beginning Android 3; Apress Springer India Pvt Ltd. ;1st Edition; 2011;ISBN13: 978-1-4302-3297-1

2 .Sayed Hashimi , Satya Komatineni, Dave MacLean; Pro Android 4; Apress Springer India Pvt Ltd; 1st Edition; 2012; ISBN: 978-1-4302-3930-7

3 .Reto Meier; Professional Android 2 Application Development; Wiley India Pvt.ltd; 1st Edition; 2012; ISBN: 9788126525898

4. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional; 2010.

E-Resources:

1. https://developers.google.com/training/adf
2. https://goo.gl/ADKvq8
3. https://innovator.samsungmobile.com

OBJECT ORIENTED MODELING AND DESIGN (IC)					
Course code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSI731	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FE**

Course Objectives:

This course will enable students to:

- Understand the concepts of object oriented approach to perform systems analysis and design.
- Learn the importance and limitations of object-oriented analysis and design.
- Show how object oriented analysis and design is applied in development of software.
- Point out the importance of UML model throughout the process of object oriented modeling and design.
- Gain the necessary knowledge and skills in using object-oriented CASE tools

Syllabus

Module-I

Introduction, Modeling Concepts, class Modeling: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history

Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models. **8 Hours**

Module-II

Advanced Class Modeling, State Modeling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages.

State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; examples. **8 hours**

Module-III

Advanced State Modeling, Interaction Modeling: Advanced State

Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models.

Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models. **8 hours**

Module-IV

Process Overview, System Conception, Application Analysis: Process Overview: Development stages; Development life cycle.

System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement.

Application Analysis: Application interaction model, Application class model, application state model, adding operations. **8 hours**

Module-V

System Design: Application Design and implementation modeling : Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing. **8 hours**

Laboratory

Develop a mini-project for the following 12 exercises listed below.

1. To develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. 8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

Suggested domains for Mini-project.

1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. 5.Online course reservation system
6. E-ticketing
7. Software personnel management system
8. Credit card processing

9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System

Course Outcomes:

On completion of this course, the students are able to:

- Construct models to Show the importance of systems analysis and design in solving complex problems
- Recognize the difference between various object relationships: inheritance, association, and dependency relationships.
- Represent an object-oriented system using a number of modeling views.
- Apply the role and function of each UML model in developing object-oriented software.
- Estimate System performance and construction of UML models and expressing the appropriate notation associated with each model.

Text Book:

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005.(Chapter 1,2,4,5,6,7,10,11,13,14,17), ISBN 978-81317-1106-4

Reference Books:

1. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, Wiley- Dreamtech India, 2004. ISBN: 978-0-471-46361-0
2. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition, Pearson Education, 2007. ISBN-13: 978-0201895513

E-Resources:

1. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_functional_modeling.htm
2. https://en.wikipedia.org/wiki/Object-oriented_analysis_and_design

BIG DATA (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSI732	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FE**

Course Objectives:

This course will enable students to:

- Understand big data, types, benefits, industry examples for business intelligence.
- Understand Nosql data models.
- Learn how to manage Nosql data with multiple databases.
- Understand Hadoop, map-reduce architecture and Fundamentals.
- Learn HBase, Cassandra, Cassandra Query language, data replication.

Syllabus

Module – I

Overview of Big Data: Defining Big Data, Big Data Types, Analytics, Industry Examples of Big Data, Benefits of Big Data, Crowd Sourcing Analytics, Indian Big Data companies. **7 hours**

Module – II

NoSQL Data Management-1: Introduction to NoSQL, aggregate data models, aggregates, key, value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models,

sharding, version, Map reduce, partitioning and combining, composing map-reduce calculations.
8 Hours

Module – III
NoSQL Data Management-2: Key Value Databases, Document Databases, Column Family Stores, Graph Databases**.** **8 Hours**

Module – IV
Basics of Hadoop: Understanding Hadoop features, Learning the HDFS and MapReduce architecture, Introducing Hadoop MapReduce, Understanding the Hadoop MapReduce fundamentals.
8 Hours

Module – V
Hbase and Cassandra: Introduction to HBase, Row-Oriented vs Column-Oriented data stores, HBase Architecture, Understanding HBase Data Model, Casandra: Introduction, Features of Cassandra, Data Replication in Cassandra, Cassandra Query language(CQL), Cassandra Data Model.
9 Hours

Laboratory:
Exercise 1 --- HDFS
Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system.
You will use the hadoop fs command when interacting with HDFS.
1. Review the commands available for the Hadoop Distributed File System:
2. Copy file foo.txt from local disk to the user's directory in HDFS
3. Get a directory listing of the user's home directory in HDFS
4. Get a directory listing of the HDFS root directory
5. Display the contents of the HDFS file user/fred/bar.txt
6. Move that file to the local disk, named as baz.txt
7. Create a directory called input under the user's home directory
8. Delete the directory input old and all its contents
9. Verify the copy by listing the directory contents in HDFS:

Exercise 2 --- MapReduce
1. Create a JOB and submit to cluster
2. Track the job information
3. Terminate the job
4. Counters in MR Jobs with example
5. Map only Jobs and generic map examples
6. Distributed cache example
7. Combiners, Secondary sorting and Job chain examples

Exercise 3 --- MapReduce (Programs)
Using movie lens data
1. List all the movies and the number of ratings
2. List all the users and the number of ratings they have done for a movie
3. List all the Movie IDs which have been rated (Movie Id with at least one user rating it)
4. List all the Users who have rated the movies (Users who have rated at least one movie)
5. List of all the User with the max, min, average ratings they have given against any movie
6. List all the Movies with the max, min, average ratings given by any user.

Course Outcomes: On completion of this course, the students are able to:
- Describe big data, types, and benefits and used cases from selected business domains.
- Explain NoSQL big data using data models.
- Use various databases like Key value, documents, etc.
- Explain Hadoop, perform map-reduce analytics using Hadoop

- Use Hadoop related tools such as HBase, Cassandra.

Text Books:

1. V K Jain, “BIG DATA and HADOOP”, 2017 edition, Khanna Book Publishing. ISBN:978-93-82609-13-1 (chapters 1.2, 1.4, 1.5, 1.6, 1.16, 1.19, 1.20 and 6.1, 6.2, 6.4, 6.6, 6.8, 6.9, 6.11, 6.13, 6.14)
2. Pramod J. Sadalage, Martin Fowler, “NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence”, Addison-Wesley. ISBN: 9780133036121 (Chapter 2, 3, 4, 8, 9, 10 and 11)
3. Vignesh Prajapati, “Big data analytics with R and Hadoop”, 2013, SPD. ISBN 13: 978-93-5110-410-0 (Chapters 1, and 2)

Reference Books:

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

E-Resources:

1. http://www.tutorialspoint.com/hadoop/
2. http://www.sas.com/en_us/insights/big-data/what-is-big-data.html

WEB TECHNOLOGIES – Servlet, JSP (IC)					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSI733	**3:0:2:0**	**4**	**CIE:50 SEE:50**	**3 hours**	**FE**

Course Objectives:

This course will enable students to:

- Understand the concepts of Web Technologies.
- Understand what are Web Servers and App Servers, and their differences.
- Understand Request and Response models
- Understand how to build e-commerce applications using Servlets and JSP
- Understand what EL and EL Tags are, and their usage in developing dynamic web pages.

Syllabus

Module – I

Introduction to Web Technologies:JEE, PHP, ASP and .Net
Introduction Web Dev environment: App Server, Web Server, 2-Tier and 3 -Tier Architecture
Introduction to Servlet: Introduction to JEE containers, Application directory structure, Servlet Interface / Generic Servlet / HttpServlet, Servlet life cycle, Request and Response objects, Building sample application.
8hours

Module – II

Inter Servlet Communication: RequestDispatcher, Include / Forword / Redirect, Building sample application
Session Management: Creating & invalidating session, Different ways to handle session, Session time out configuration. **8 hours**

Module – III

Introduction to JSP: Need for JSP, JSP life cycle. **6 hours**

Module – IV

Introduction to EL: Need for EL and its advantages, Fundametals of EL
EL Tags: Core Tags, Introduction to MVC, Building sample application. **8 hours**

Module – V

Project Work: Create an e-commerce application using the client-side languages, such as Bootstrap3, HTML5, CSS3, JavaScript and jQuery, along with the server-side Java language - Servlets and JSP.
10 hours

Laboratory

1. Programs covering Web Technologies, Web Dev environment, Servlet.
2. Programs covering Inter Servlet Communication, Session Management.
3. Programs covering JSP, Introduction to EL, EL Tags.

Course Outcomes: On completion of this course, the students are able to:

- Understand the concepts of Web Technologies.
- Understand what are Web Servers and App Servers, and their differences.
- Understand Request and Response models.
- Understand how to build e-commerce applications using Servlets and JSP
- Understand what EL and EL Tags are, and their usage in developing dynamic web pages.

Text Books:

1. Head First Servlets and JSP; Basham, Bryan, Sierra Kathy, Bates, Bert;Shroff; Second edition; ISBN-10: 8184044976
2. JDBC 4.2, Servlet 3.1, and JSP 2.3 Includes JSF 2.2 and Design Patterns, Black Book; Santosh Kumar K;Dreamtech Press; Second edition;ISBN-10: 9351199088

Reference Books:

1. Servlet & JSP: A Tutorial, Second Edition; Budi Kurniawan; Brainy Software; Second edition;ISBN-10: 1771970278

SYSTEM MODELING AND SIMULATION					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CST741	**3-0-0-0**	**3**	**CIE:50**	**3 Hours**	**EE**

			SEE:50		

COURSE OBJECTIVES:

This course will enable students to

- Study the basic system concept and definitions of system;
- Understand the techniques to model and to simulate various systems;
- Acquire knowledge to analyze a system and to make use of the information to improve the performance.
- understand the value of rapid prototyping for: requirements, potential design issues, modelling inputs
- understand the need for quantification and understand the limits of quantification

Syllabus

MODULE 1

Introduction: When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. The basics of Spreadsheet simulation, Simulation example: Simulation of queuing systems in a spreadsheet. **8 Hours**

MODULE 2

General Principles, Simulation Software: Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling;

8 Hours

MODULE 3

Random-Number Generation, Random-Variate Generation: Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties.

8 Hours

MODULE 4

Input Modeling : Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models. **8 Hours**

MODULE 5

Verification, Calibration, and Validation; Optimization: Model building, verification and validation; Verification of simulation models; Calibration and validation of models, Optimization via Simulation.

8 Hours

COURSE OUTCOME: On completion of this course, the students will be able to:

- Explain the system concept and apply functional modelling method to model the activities of a static system;
- Apply the behaviour of a dynamic system and create an analogous model for a dynamic system;
- Assess and select a model for an engineering system taking into consideration its suitability to facilitate engineering decision making and predicted advantages over alternative models.
- Explain the simulation results of an engineering system model, within the context of its capabilities and limitations, to address critical issues in an engineering project.
- Manage expectation level of different stakeholders

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation,(Chapters, 1,2,3,4,5,6,7,8,9,10,11,12), 5th Edition, Pearson Education, 2010, ISBN: 9789332518759.

Reference Books:

1. Lawrence M. Leemis, Stephen K. Park: Discrete – Event Simulation: A First Course, Pearson Education, 2006, ISBN: 9780132020565.
2. Averill M. Law: Simulation Modeling and Analysis, 4th Edition,Tata McGraw-Hill, 2007, ISBN: 9780070667334.

E-Resources:
1. http://home.ubalt.edu/ntsbarsh/simulation/sim.htm
2. http://searchworks.stanford.edu/view/10091706

TAX MANAGEMENT					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16HOE751	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3 hours**	**OE**

Course Objectives:

This course will enable students to understand:

- To familiarise the students with the significance of taxation system
- To understand the structure of Indian Taxation system.
- To gain knowledge about the practical aspects of Indian taxation
- To understand the system of computation of tax from Salaries
- To sketch the recent trends in Indian taxation system

Syllabus

Module – I

Introduction to taxation system, Objectives of taxation, Factors to be considered for tax planning Canons of taxation, Types of taxation, Direct tax, Indirect tax (Broad perspective only).

7 Hours

Module – II

Taxation system in India, Types of taxes levied in India, Various heads of income tax (Broad outline only} Basic concepts in taxation, Assessment year, Financial year, assessee, Residential status, Tax liability.

8 Hours

Module – III

Income tax authorities in India, Constitution, Powers, Functions specimen of Form 16, Filing of returns, tax evasion, Penalties for contravening the provisions of income tax. **8 Hours**

Module – IV

System of computation of tax from salaries, Taxable income, Permissible deductions from 80C to 80U Fringe benefits exempted from tax, exempted income under section 10 of Income tax act.

10 Hours

Module – V

Trends in Indian taxation system, Self assessment, PAN card, Budgetary provisions of the financial year 2017-18 on taxation, GST, Advantages, Problems in implementing GST, Measures to overcome the limitations of GST.

6 Hours
Course Outcomes: On successful completion of this module, students will be able to: •
Text Books: 1.
Reference Books: Reference Books 1.Dr.Vivnod K. Singhania: Direct taxes-Law and Practice, Taxmann Publication 2.Dr.Mehrotra and Dr.Goyal: Direct taxres- Law and Practice, Sahitya Bhavan publication 3.7 lectures-Income tax-I,VBH 4.Swaminathan-Income Tax KPH 5. T.N.Manoharan, Income tax including VATT 6.R.G.Saha,Ushadevi - Taxation -HPH

ASSESSMENT OF BUILDING ENERGY PERFORMANCE					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16HOE752	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3 hours**	**OE**

Course Objectives:

This course will enable students to:

- Provide a foundation for performing a building energy audit
- Perform assessment tasks on building energy performance
- Submit a Building EQ rating
- Understand the methods and processes to be performed in the field
- Know the process of certifying professionals in energy assessment

Syllabus

Module – I

Introduction, global energy consumption characteristics and the role of commercial and residential buildings, building energy end use consumption characteristics, impact of time variations in building energy consumption, Building mechanical, electrical, and lighting systems. **08 hours**

Module – II

Anatomy of typical HVAC systems in commercial buildings , typical primary and secondary HVAC equipment and their role in meeting system requirements , basics of electrical distribution systems and their equipment in commercial buildings , basics of lighting system in buildings, including performance terminology, lighting technologies, energy performance, and the role of day lighting.

08 hours

Module – III

Introduction to building energy benchmarking and assessment , differences between benchmarking, labeling programs, and energy and environmental auditing, role of building type and climate zone on energy use, key aspects of ENERGY STAR® Portfolio Manager and other tools for benchmarking, ASHRAE Building EQ As Designed and In Operation ratings , differences between Building EQ and Portfolio Manager , Preliminary Energy Use Analysis (PEA)

08 hours

Module – IV

Measuring and monitoring building performance , instrumentation for measuring indoor environmental quality and building energy flows, Perform measurements of indoor environmental quality and building energy flows , accuracy of building measurements, Identify the components of an ASHRAE Level 1 walk through survey and

the differences between Level 1, 2, and 3 surveys , Indoor Environment Quality.
08 hours

Module – V

Energy Efficiency Measures – Building Envelope and Lighting, role of building envelope characteristics on energy use , energy conservation and energy efficiency measures related to envelope and lighting characteristics , Energy Efficiency Measures – HVAC Systems , energy conservation and energy efficiency measures related to HVAC systems , financial analysis of expected improvements to HVAC systems.
08 hours

Course Outcomes:

On completion of the course, the student will be able to:

1. Produce an ASHRAE Building EQ In Operation rating for the buildings provided in the class
2. Produce a listing of potential Energy Efficiency Measures (EEM) including financial payback analysis
3. Perform measurements of indoor environmental quality and HVAC system performance
4. Identify different building types and determine the impact of climate on energy use.
5. Analyze raw energy consumption data from measured-meter readings

Text Books:

1. ASHRAE Building Energy Quotient Program website
2. ASHRAE BEAP certification study guide
3. ASHRAE Standard 105-2014 Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emission

Reference Books:

1. ASHRAE Performance Measurement Protocols for Commercial Buildings: Best Practices Guide
2. ENERGY STAR® Portfolio Manager website

NATURAL DISASTER MITIGATION AND MANAGEMENT					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16HOE753	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3 hours**	**OE**

Course Objectives:

Students will be able to

- To teach students about types of natural and environmental disasters.
- To help students to develop skills in various stages of disaster preparedness, mitigation and management.
- To teach the students the methodologies for disaster risk assessment.

Syllabus

Module – I

Natural Disasters – Overview

Introduction- Natural Disasters around the world- Natural Disaster Risk Assessment- Earth and its characteristics Human Dimensions of Global environment Change – Disaster mitigation, preparedness, response and recovery comprehensive emergency management Early warning systems and Disaster Preparedness– Rehabilitation, Vulnerable Populations - Logistics and Services, Food, Nutrition and Shelter -Role of UN Red cross and NGOs.

8Hours

Module – II

Natural Hazards

Introduction and Review - Natural Disasters -Principles, Elements, and Systems - Geological-Geomorphological aspects, - Earthquake-Geology, Seismology, Characteristics and dimensions– Landslides- Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc- Tsunami - Nature and characteristics.

8 Hours

Module – III

Climate system aspects and Processes

Oceanic, Atmospheric and Hydrologic cycles - Severe Weather & Tornadoes , Cyclones, Floods and Droughts - Global Patterns - - Mitigation & Preparation – Drought – Famine- nature and dimensions – Drought Assessment and Monitoring. **8 Hours**

Module – IV

Natural Disaster Communication

Mapping - Modeling, risk analysis and loss estimation – Natural disaster risk analysis - prevention and mitigation - Applications of Space Technology (Satellite Communications, GPS, GIS and Remote Sensing and Information / Communication Technologies (ICT) in Early warning Systems - Disaster Monitoring and Support Centre– Information Dissemination, mobile communication – etc.

8 Hours

Module – V

Administrative mechanisms

Community and Social organizations – Education and Training – Establishment of capacity building among various stake holders – Government - Educational institutions – Use of Multi-media knowledge products for self education.

8 Hours

Course Outcomes:

On successful completion of this module, students will be able to:

1. Learn about the types of natural and environmental disasters and its causes.
2. Learn about organizational and Administrative strategies for managing disasters.
3. Learn about the early warning systems, monitoring of disasters effect and necessity of rehabilitation.
4. Learn about the engineering and non-engineering controls of mitigating various natural disasters.
5. Understand the key roles of capacity building to face disaster among government bodies, institutions, NGO's, etc.
6. Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies, etc.

Text Books:

1. Kovach, Robert L. Earth's Fury (1995), An Introduction to Natural Hazards and Disasters, Englewood Cliffs, N.J., Prentice Hall.
2. Siddhartha Gautam, K Leelakrishna Rao Natural disaster Management 3rd Edition 2012,ISBN: 9381604320

Reference Books:

1. Arul Jothi, D L Balaji (2009) Safety And Disaster Management Education In Schools 01 Edition by Anmol Publications, ISBN: 9380252609.

e-Resources:

1. https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr.../bt-dsstr-mtgtn-en.aspx
2. www.nrdms.gov.in/natural_disaster.asp
3. https://www.ncbi.nlm.nih.gov › NCBI › Literature › Bookshelf

SMALL AND MEDIUM ENTERPRISE MANAGEMENT

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
16HOE761	2:0:0:4	3	CIE:50 SEE:50	3 hours	OE

Course Objectives:

1. To give the students, the basic understanding of the various concepts of Entrepreneurship and familiarize them with the understanding of contemporary environment of MSMEs.
2. To provide the basic understanding of the Business Environment to MSMEs.
3. To provide the basic understanding of Process of Enterprise Creation.
4. To provide the basic understanding of Effective Business Plan and Institutional Support Mechanism
5. To familiarize the students with the concepts of marketing management in the MSMEs.

yllabus

Module-I

asic Aspects: Concept, nature of Entrepreneur & Entrepreneurship, Distinction between Entrepreneur and Manager, ntrepreneurship, Medium, Small and Tiny Business : Definition, Role in the economy and significance, Changing scenario of SMEs in the era of Liberalization & Globalization, Competitiveness, **10 ours**

Module-II

nvironment assessment: Political, Legal, Economic, Social, Technological, Global environment, Assessment of business pportunities, Government initiatives and private sector opportunity.

0 hours

Module-III

nterprise Creation: Starting a small industry, Entrepreneurial function or process of starting a new venture based on personal ompetencies, requirements to start a business venture, Feasibility of the project, Business incubators

0 hours

Module-IV

usiness Plan: Developing effective business plan-meaning, benefits of business plan, Timing of the business plan, Length of he business plan, composition of the business plan or detailed project report. Institutional Support Mechanism: District ndustries Centre, State Directorate of Industries, SIDBI, NSIC, SISI, KSFC, KIADB, TECSOK.

0 hours

Module-V

mall Business Marketing: Concept of Marketing, Scope of Marketing, Marketing Mix, Product Mix, Channels of istribution, Market Segmentation, Role of Middlemen, Distribution Strategies, Sales Promotion, Advertising and Publicity, ackaging Strategies, Branding Strategies **10 hours**

Course Outcomes: On completion of this course, the students are able to:

1. Understand various concepts of Entrepreneurship and understand of current environment of MSMEs.
2. Understand the Business Environment with respect to MSMEs.
3. Understand the Process of Enterprise Creation.
4. Prepare Business Plan and Understand the Institutional Support Mechanism
5. Understand the marketing management with reference to MSMEs.

ext Books:

- Shukla, MB, (2011), Entrepreneurship and Small Business Management, Kitab Mahal, Allahabad
- Sahay A., V. Sharma (2008), Entrepreneurship and New Venture Creation, Excel Books, New Delhi.
- Lall, Sahai (2006), Entrepreneurship, Excel Books, New Delhi.
- S.Anil Kumar,(2008), Small Business and Entrepreneurship, I.K.International Publishing House Pvt Ltd
- Kotler, Keller, Koshy and Jha, Marketing Management, 13th Edition Pearson

ducation

eference Books:

- Wickham, Phillip A (1998); Strategic Entrepreneurship, Pitman, UK.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16HOE762	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3hours**	**OE**

Course Objectives:

The objectives of learning the subject are to understand,

- the occupational health and safety and sector specific occupational health and safety issues.
- the socio economic aspects of occupational health and safety.
- the health screening measures.
- the legal Provisions on Occupational Health and Safety.
- the participatory Research and Occupational Health.

Syllabus

Module – I

Introduction to Occupational Health and Safety:

Definition and Context of OHS, Objectives and Principles of OHS, Workplace and Health Occupational Health, Hygiene and Ergonomics.

Sector Specific Occupational Health And Safety Issues

Health and Safety Risks in Mining, Health Hazards in Electronic Industry, Health Hazards in Food Processing Industry, Health Hazards in Other Industries. **7 hrs**

Module – II

Socio-Economic Aspects of Occupational Health and Safety

Women's occupational and health safety, Child labour issues in occupational health and safety, Health issues in the unorganized sector.

Basics of Preventive Techniques

Definition of Accident, Accident Analysis, Monitoring of Hazards, Reporting and Investigation of Accidents.

8 hrs

Module – III

Health Screening Measures

Stages of Medical Examination • Occupational History • Pulmonary Function Test (PFT) • Noise Induced Hearing Loss (NIHL) **7 hrs**

Module – IV

Legal Provisions on Occupational Health and Safety

Overview of existing OHS Legislations in India • The Factories Act • The Mines Act • The Workmen's Compensation Act • The Employee's State Insurance Act **7 hrs**

Module-V

Participatory Research and Occupational Health

Philosophy of Participatory Research (PR) Analysis based on PR Methodologies Conducting Participatory Research for OHS **7 hrs**

Course Outcomes: On completion of this course, the students are able to:

- develop the ability to know the occupational health and safety.
- have the knowledge of the socio economic aspects of occupational health and safety.
- demonstrate purpose of health screening measures.
- understand legal Provisions on Occupational Health and Safety
- understand participatory Research and Occupational Health

References:

1. International Labour Organinization. Mining: a hazardous work [Internet]. ; 2015 ([cited 2015 Feb 2]. Available from: http://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_124598/lang--en/index.htm
2. Gyekye, S.A. Workers' perceptions of workplace safety: an African perspective. *Int J Occup Saf Ergon*. 2006;12:31–42.Crossref | PubMed| Scopus (4)
3. Amponsah-Tawiah, K., Jain, A., Leka, S., Hollis, D., Cox, T. Examining psychosocial and physical hazards in the Ghanaian mining industry and their implications for employees' safety experience. *J Safety Res*. 2013;45:75–84.Crossref PubMed| Scopus (5)
4. Owiredu D. Annual chamber of mines presidential review. 83rd Annual General Meeting of the Ghana Chamber of Mines [Internet]. 2011 [cited 2014 Mar 1]. Available from:http://www.ghanachamberofmines.org.
5. Helliwell, J.F., Putnam, R.D. The social context of wellbeing. *Philos Trans R Soc Lond B Biol Sci*. 2004;35:1435–1446.Crossref| Scopus (550)
6. Bhagawati, B. Basics of occupational safety and health. *IOSR J Environ Sci Toxicol Food Technol*. 2015;9:91–94.
7. Amponsah-Tawiah, K., Dartey-Baah, K. Occupational health and safety: key issues and concerns in Ghana. *Int J Bus Soc Sci*. 2011;14:120–126.
National Safety Council. Injury facts. NSC, Itasca (IL); 2004.

ANIMATION AND MULTIMEDIA ENGINEERING					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16HOE763	**2:0:0:4**	**3**	**CIE:50 SEE:50**	**3 hours**	**OE**

Course Objectives:

This course will enable students to:

- Understand the basics of Animation.
- Understand computer animation using characters.
- Learn how to create quality animation characters.
- Learn about volume construction and action made from face, gestures.
- Understand Acting and Sketching techniques.

Syllabus

Module – I

Introduction to Animation: History of Animation, The Origins of Animation, Types of Animation, Terms used in Animation, Basic Principles of Animation.

Introduction to equipment required for Animation: Animator's Drawing Tools, Rapid Sketching and Drawing, Developing Animation Character. **7 Hours**

Module – II

Developing the characters with computer animation: I Anatomy & Body Language, 2 D virtual drawing for animation.

Motion studies: Thumbnails, sequential movement drawing, drawing for motion. **8 Hours**

Module – III

Essentials & qualities of good animation characters: Three dimensional drawings of characters.

Skills and Basic proportions: Visual and creative development of an artist, how to draw gestures, Heads, Rotation in Arcs, Key Lines, Perspective. **8 Hours**

Module – IV

Volume Construction: Balance, Muscles, Light and shade.

Shape and Action: Hands & Legs, Foreshortening, Facial expressions. **8 Hours**

Module – V

Acting and Sketching techniques: Introduction to Acting, Modeling, Sketching from Acting, Sketching from live models, Introduction to Rapid Sketching Techniques, Sketching from Memory, live action.

9 Hours

Course Outcomes: On completion of this course, the students will be able to:

- Understand the basics of Animation along the tools.
- Develop characters with computer animation.
- Develop 3D drawings of characters and acquire skills regarding basic level of sketching.
- Explain Foreshortening, Facial expressions.
- Develop small Animation characters by using acting and sketching techniques.

Text Books:

3. Chris Patmore, "The Complete Animation course: The Principles, Practice and Techniques of Successful Animation", (Chapters 1-10), Barons Educational Series (New York), 2003, ISBN-13: 978-0764123993.

Reference Books:

1. Frank Thomas and Ollie Johnston**, "**The Illusion of Life by Walt Disney", Abbeville Press, 1981.
2. Daniel Carter and Michael Courtney, "Anatomy for the Artist: A Comprehensive Guide to Drawing the Human Body, a Complete Guide", 2011.

E-Resources:

4. http:// www.animationmentor.com/
5. https://www.bloopanimation.com/animation-for-beginners/
6. https://robots.thoughtbot.com/css-animation-for-beginners

INFORMATION AND NETWORK SECURITY LABORATORY					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSL77	**1:0:2:0**	**2**	**CIE:50 SEE:50**	**3 hour**	**FC**

Course Objectives:

This course will enable students to:

- Work on Open Source cutting edge tools to find solutions for the problems in the field of Information and network security
- Understand what are the foundational theory behind information security,
- Analyze basic principles and techniques when designing a secure system,
- Study how today's attacks and defenses work in practice,
- Assess threats for their significance, and how to gauge the protections and limitations provided by today's technology

Laboratory

1. Perform an experiment to grab a banner with telnet and perform the task using Netcat.
2. Using nmap 1) Find Open ports on a system
   2) Find machines which are active
   3) Find the version of remote OS on other systems
   4) Find the version of s/w installed on other system
   (using nmap or any othe software)
3. Perform an experiment to demonstrate how to sniff for router traffic by using the tool Cain and Abel / Wireshark / tcpdump
4. Perform an experiment to demonstrate the use of DumpSec.
5. Perform a wireless audit of an access point / router and decrypt WEP and WPA. (Using NetStumbler or airsniff)
6. Perform an experiment to sniff traffic using ARP poisoning
7. Demonstrate Intrusion Detection System (IDS) using any tool such as Snort or any other Software.
8. Install RootKit and study variety of options
9. Generate minimum 10 passwords of length 12 characters using OpenSSL command.
10. Setup a honey pot and monitor the honey pot on network.
11. Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management.
12. Install IPCop on a linux system and learn all the functions available on the software.

Course Outcomes

On completion of this course, the students will be able to:

- work on Open Source cutting edge tools to find solutions for the problems in the field of Information and network security
- know which application runs on specific port, scan for open ports
- Able to capture and analyze network traffic
- Perform audit settings, detect intruders in the network
- Implement standard algorithms used to provide data confidentiality, integrity and Authentication.

Text Books

1. William Stallings: Network Security Essentials: Applications and Standards, 3rd edition, Pearson Education, 2007
2. Michael E. Whiteman and Herbert J. Mattord: Principles of Information Security, 2nd edition, Cengage Learning, 2005.

Reference Books:

1. Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw-Hill, 2007

E-Resources:

1. https://www.nmap.org
2. https://www.advanced-port-scanner.com
3. https://www.openssl.org

ANDROID APPLICATION DEVELOPMENT LABORATORY					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSL78	**1:0:2:0**	**2**	**CIE:50 SEE:50**	**3 hour**	**FC**

Course Objectives:

This course will enable students to:

- Describe the Android SDK features and the Development Framework and understanding Activities.
- Create adaptive, responsive user interfaces that work across a wide range of devices.
- Perform background work and long-running tasks in Android applications
- Know the concepts of Storing, sharing and retrieving data in Android applications
- Learn how permissions, security and performance affect application. Finally, make sure your app is ready to share with the world, and publish it.

Part-A

Programs supplement the lecture concepts will be based on the latest version of Android SDK.

1. Install Android Studio and Run Hello World
2. Create and Start Activity Lifecycle and Instance State
3. Create Implicit Intents
4. Make Your First Interactive UI Using Layouts and TextView Elements
5. Using An Options Menu
6. Create a RecyclerView
7. Drawables, Themes and Styles
8. Create an AsyncTask
9. Connect to the Internet
10. BroadcastReceiver
11. Set and retrieve shared preferences
12. Implement a simple content provider

Part-B

Develop a suitable application to implement the skills learnt in the theory and the exercises indicated in Part-A.

Course Outcomes

On completion of this course, the students will be able to:

- Comprehend the basic features of Android Platform and Create Activities in Android.
- Demonstrate the design concepts of user interface using components, views and menus in Android.
- Create and use databases for Android Application.
- Implement messaging services in Android.
- Deploy mobile applications in various marketplaces for distribution.

Text Books:

1. Wei – Meng Lee, Beginning Android Application Development, Wiley publications
2. Reto Meier, Professional Android 4 Application Development, Wiley publications .

Reference Books:

1 .Mark Murphy; Beginning Android 3; Apress Springer India Pvt Ltd. ;1st Edition; 2011;ISBN13: 978-1-4302-3297-1
2 .Sayed Hashimi , Satya Komatineni, Dave MacLean; Pro Android 4; Apress Springer India Pvt Ltd; 1st Edition; 2012; ISBN: 978-1-4302-3930-7
3 .Reto Meier; Professional Android 2 Application Development; Wiley India Pvt.ltd; 1st Edition; 2012; ISBN: 9788126525898
4. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To,

Addison-Wesley Professional; 2010.

E-Resources:

1. https://developers.google.com/training/adf
2. https://goo.gl/ADKvq8
3. https://innovator.samsungmobile.com

Project & Seminar					
Course Code	**L:T:P:S**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
16CSP79	**0-0-6-0**	3	100	3 Hours	**FC**

Phase	**Activity**	**Credits**
I	Batch formation, project identification, literature survey, finalization of problem statement with objectives and outcomes, Synopsis submission, Preliminary seminar for the approval of selected topic and objectives	**3**

Eighth Semester B. E. – Scheme

Phase	**Activity**	**Credits**
II	Design, Theoretical/experimental investigation and Mid-term seminar to review the progress of the work and documentation(Mid term report)	**4**
III	Completion of the project work, participation in the project exhibition, Submission of project report Final Internal seminar and demonstration, Publications	**4**
	Evaluation and Viva voce	**5 +5**